

# Oklahoma Broadband Mapping

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## Data Submission Methodology Report

April 1, 2014



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# 1 Introduction

This report is submitted along with the ninth data submission for the Oklahoma Broadband Mapping Project. This submission includes all data collected to date per the requirements of the National Telecommunications and Information Administration (NTIA) State Broadband Data and Development Grant Program (Docket No. 0660-ZA29) Notice of Funds Availability (NOFA) and formal and informal clarifications to it. Specifically, it includes broadband data collected from broadband providers and community anchor institutions data compiled from various sources for the State of OK. The State of OK has retained a mapping contractor, The Sanborn Map Company to perform the work related to the Mapping Grant for this project. Data from the previous submission is now publicly accessible via the OK Broadband Program (<http://broadbandmapping.ok.gov/>).

**This document is a supplement to the eight previous reports submitted with previous data submissions on May 1, 2010, October 1, 2010, April 1, 2011, October 1, 2011, April 1, 2012, October 1, 2012, April 1, 2013, and October 1, 2013.** Therefore, it builds on the documents provided with those submissions. Rather than repeat the contents of the previous reports, this document makes incremental updates on various topics where changes have been made in the methodology or reiterates the methodology used. Please refer to the previous documents for further details.

## 2 Overall Project Status

### 2.1 DATA COLLECTION

This section details data collection related to NTIA deliverables which include broadband data and community anchor institution data.

#### 2.1.1 Broadband Data

For this submission, Sanborn started data collection efforts on January 8<sup>th</sup>, 2014 by sending out data update requests and technical data specifications. These were sent to a large list of companies which were compiled from multiple lists (FCC 477 list (dated December 30, 2012 (as submitted in filings made or revised as of August 16, 2013)), Wireless Internet Service Providers Association (WISPA)), Rural Utilities Service (RUS) website, and from any providers that were identified through other sources such as web research, planning meetings, State outreach, etc. Sanborn also uploaded the final data for each provider in NTIA format from the previous submission on the Sanborn Provider Portal. The providers were encouraged to use the provider portal and update their information on it.

We followed the same contact and follow-up protocols as the previous submissions. In brief, this involved following up with already participating providers after sending them a letter requesting data updates. For newly identified providers, we contacted them three additional times and offered any/all support to make this as easy as possible. We provided a due date for submission but worked with providers who needed more time. If participating providers did not submit updated data and did not respond to our efforts to contact them, we reused their existing data.

The following are some of the important changes or no changes:

- 1) We continued to request all providers to provide us their speed information in mbps rather than as a speed tier. We did this in order to better validate the data, analyze served/underserved, and identify the breakdowns in speeds within a given tier. However, we have found over the last few submissions; this has caused some confusion between what we are asking for (speeds in mbps) vs. typical speeds. Given that many providers are not providing this information, it is hard to use the data effectively for analysis.
- 2) As in the previous submission, we also requested fixed wireless providers to provide us appropriate information to do propagation analysis. We conducted propagation analysis for two providers (Plainsnet and DCM – Del Nero Communications Management – WIMAX) this submission, and received improved propagation from two providers (The Junction and HTS Wireless) through Link Technologies. For those WISP providers that

provided us the data to accomplish propagation, we used Radio Mobile to do propagation analysis and iterated with the providers until the parameters were suitably selected to get appropriate output. Propagation analysis results were provided to the providers for review through our provider portal and Google kmz file formats to ensure validation.

- 3) As in the past, we did not include resellers in the submission.
- 4) Due to our NDA restrictions, last mile infrastructure points, if submitted by providers, are not being submitted to NTIA. Likewise, address points are not included in this submission for any provider.
- 5) We continue to submit data for satellites in this submission based on NTIA clarifications. In this submission, we were told by Viasat that they are reducing service in the eastern half of the state because one of their satellites reached capacity and they were not accepting new customers for that part of the state. We requested guidance from NTIA about how to handle this and did not hear back – so we have gone ahead and represented their service as they told us to.
- 6) We made a more concerted effort to find out whether providers were business only but once again, we did not get many providers that broke down the type of service by blocks or road segments. If the provider stated they only serve business to business customers did we filled in the “category of end user” with a code of 2, or if they told us specifically that they serve only residential, we used a code 1. Those that did not confirm their end user codes, we verified online and those we couldn’t, we calculated as a 5 unless we knew from other sources that they needed to be something else. There are four providers in OK who are identified as serving primarily business customers. These are:
  - a. Cogent Communications, Inc.
  - b. Level 3 Communications, LLC
  - c. TW Telecom of Oklahoma LLC
  - d. XO Communications, LLC
- 7) This submission is being made based on the NTIA data model as of January 24, 2014 provided by NTIA.
- 8) Terrestrial Mobile Wireless and Terrestrial Fixed Wireless (licensed and unlicensed) were again treated as wireless coverage and were delivered as a shape. In cases where a provider served the same spectrum with different speeds, overlapping areas were removed and the higher speed was assigned. The exception to this rule is where a provider is using the same spectrum, but delivering different underlying technologies such as 3G, 4G, or 4G LTE. In this case a continuous polygon is being created that represents the area that is offered for both 3G and 4G even if these polygons overlap.

9) Where providers told us to reuse data from the previous submission or did not respond to our data request, we are resubmitting data that was submitted in S8. We have validated their data against new speed test points and other feedback from our Interactive Map.

10) We have added the following new provider in this submission:

- a. DCM – Del Nero Communications Management – WIMAX

For this submission:

- 1) We have contacted a total of 217 providers in OK, of which 12 providers were contacted for the first time.
- 2) We have identified 115 potential providers, of which 94 are participating in this map to date and 21 have refused to participate. In addition, 7 providers have not responded to our efforts to contact them and we are not sure whether any of these providers are actual providers or not. A list of the non-responders, resellers and non-providers is provided at the end of the document and all of these potential broadband providers were contacted. Even if some providers were identified as non-providers or resellers in previous submissions, we continue sending out data request letters to these providers in case their status has changed in any way.
- 3) Approximately, 43% of the providers submitted new or updated data whereas for the remaining providers, we reused data from their previous submissions. This is in contrast to 37% of providers submitting new or updated data in S8 and 43% participating in S7
- 4) We do not report areas of service for providers that have refused to participate or have not responded to our requests for data

During this submission period, we had the following changes in providers:

- 1) Sprint purchased the remaining shares of Clearwire.

### **2.1.2 Community Anchor Institutions Data**

Sanborn's Community Anchor Institutions process is as follows: Lists of required Community Anchor Institutions were compiled from various sources by Sanborn but primarily from the State of Oklahoma. The data was then processed to meet NTIA requirements for Community Anchor Institutions which involved geocoding where no geographic information was present, except for information on addresses. Once the geographic information was gathered, the information was loaded onto a crowd-sourcing web application that was designed to gather information about broadband subscription and broadband speeds. Through this application Sanborn continues to validate the location point of the Institutions. The Institutions are also asked to take a speed test if they were in the same/correct location while filling out the broadband service information form. In addition, we requested the Institutions to provide information on their Internet providers as well as identifying any additional providers on their forms. Also,

additional efforts to directly contact these Institutions are being done by Oklahoma University.

With regards to Oklahoma school records, we originally received a list from the state (which looked like a NCES download) that we geocoded. These records did not have any technology of transmission or speeds and this had to be gathered either via crowdsourcing or direct contact by Oklahoma University (OU). During year 4, we also upgraded our application for CAI data that involved creating a portal for OU to directly update the records. The information continues to be collected via Sanborn’s crowdsourcing web application along with OU entering updates via our web data entry page, but OU has had to contact the schools directly (via phone) to get the info.

During the next submission the Oklahoma Department of Education will be conducting additional speed tests and we will update our database with this information.

We have also added any extra schools and libraries from the websites provided by NTIA - ELSi (tableGenerator) <http://nces.ed.gov/ccd/elsi> and <https://harvester.census.gov/imls/data/pls/index.asp> (for libraries).

The numbers of community anchor institutions that have responded in Oklahoma to date are provided below:

Category	Name	Total in Submission 9	Total with Broadband Information in Submission 9
1	School - K through 12	1989	1273
2	Library	218	198
3	Medical/healthcare	446	305
4	Public Safety	1765	759
5	University, college, other post-secondary	76	40
6	Other community support - government	505	398
7	Other community support - nongovernmental	16	4

## 2.1.2.1 Issues Encountered with CAI Data Collection

### 2.1.2.1.1 Calling

Issues by CAI type

- i. Volunteer fire departments - frequently have no fixed location, office or hours. Their contact information is difficult to find and occasionally is not listed anywhere. When contacting them, they are reachable in 20-30% of contact attempts. Some are handled through a dispatch office in a larger city. However, the operators are generally unable or unwilling to help as our calls route to an emergency line.

1. Best Practice – if the volunteer agency shares its name with a city, contact that city’s government as they have information we need or can give reliable contact information for the person who does. Alternatively, when reaching an operator ask for a nonemergency number or the number of the chief of the specific department.
- ii. Police departments - Generally reachable but reluctant to share information out of concern for network and department security. Larger departments usually refer to an IT officer who is infamously unreachable.
- iii. Hospitals - Hospitals that are a part of a large health system almost always refer calls to a central IT office. These offices, despite their expertise, very often are unwilling to share any information citing concern for network security. They request that project credentials be sent in writing to administrators; time consuming, but not impossible.
- iv. Libraries – Very helpful and IT officers of larger systems are highly reachable. Smaller systems or sole branches are sometimes resource deprived and operate with a staff deficit as a result. They sometimes find our calls obtrusive to normal operations.
- v. Public Schools - present a few special issues, dependent upon district size. Very small and single campus districts are easy to capture completely, however they are closed or have very limited hours during the summer months. This is soon to be a non-issue as the school years begins. Additionally, some of the smaller districts have traveling IT officers rather than someone staffed full time. These contracted officers, rotating in and out their districts, are notoriously difficult to reach and rarely return calls and emails. When reached, however, they are a treasure trove of information and can inform on many schools in a single contact.

Larger districts are plagued by inaccurate and disparate responses; that is, results from speaking directly with schools are contradicted upon speaking with the districts IT officer. Calling individual schools in a large district produces mixed results; some are happy to answer if possible but most refer to a districts central IT office. These offices, when reachable, are very helpful and will often provide information for the entire district.

1. Best Practice – Contact the district IT office first instead of calling schools. If the schools all share the same network information, and then cross-reference this information with the district’s directory on their website. If they are not all identical, ask for the IT office to provide details on those which are not in-step with the larger network (often charter or special circumstance schools).
- vi. Chain Colleges and Vocational Schools - Ex. Vatterott, University Of Phoenix, Platt College; very challenging. Almost universally will not

release information and refer to calls to a corporate, out-of-state office. These contact numbers ring call center operators who are unsure about with whom we need to speak.

- vii. City Halls - in smaller towns and cities, frequently the only contact person is a clerk who is also responsible for administrative duties, reception duties, clerical duties, and serves community members directly. So, they may not have the time or access to data needed to respond. Coupled with limited hours of operation and limited contact means (one number, no email, no website), it makes these small vestiges of local government a challenging contact point.

### 2.1.2.1.2 Data Sharing

In an effort to streamline calling and remove redundancy, callers have begun sharing information for large organizations in a single document. This covers large metropolitan fire departments, school districts, libraries, etc. So if one caller discovers that all OKC public schools connect a certain way using a certain provider, we can simply enter this data whenever we encounter a record for a school in the district thus saving the time needed to find the number, call, and obtain the information. This reduces time investment on calling these well-documented areas so that calling can focus efforts on rural, under-reported areas.

### 2.1.2.2 CAI School Data Correction

During January, after Submission 8 was uploaded to NTIA, we were contacted regarding some unexpected values found for Transtech 50 (FIBER) in our CAI school data. Oklahoma had six records that were in question. The following are those records and the corrections made to the data in Submission 9.

ANCHORNAME	Validated_Public_Schools_Jun2013_Address	S8-TechTrans	S8-Speeds	S9- TechTrans	S9- Speeds
LEEDEY HS	505 East Sixth	50	3	50	9
LEEDEY ES	505 East Sixth	50	3	50	9
MARLOW MS	201 S. 9th	50	4	30	3
MARLOW ES	408 South 7th Street	50	4	30	5
ROFF ES	100 N Broadway	50	4	70	3
ROFF HS	100 N. Broadway	50	4	70	3

## 2.2 DATA PROCESSING

In general, Submission 9 processes followed the same basic approach that was used in earlier submissions. We started with the following base data:

### Census Blocks:

For this submission, Census 2010 data was utilized. The data was set up as follows:

- Block size (AREA) is calculated combining the 2010 land area (ALAND) and water area (AWATER)
- AREA is converted from square meters to square miles to calculate square mileage (SMI).
- If the SMI of a block is less than or equal to 2, then the less than or equal to 2 square mile indicator (LE2SMI) is set to true.
- In addition, we looked at the water area in comparison to the total block area, and if the block was 100% water, it was excluded from our reference data.

### Road Segments:

2010 Tiger Line IDs (TLID) were used for data processing for this submission. The data was set up as follows:

- The GT2SMI (Greater Than 2 Square Mile) indicator is set to True when:
  - The 2010 road segment is completely within a block that is NOT less than 2 square miles
  - Only minimum and maximum address ranges and a single zip code for each road segment is maintained.

All data received went through the following processing steps:

- 1) **Triage:** All new data were quickly reviewed to understand what was received, and in what format. We also made sure we had all the required components for NTIA's data model, such as their FRN and advertised speed information. We also screened for any known issues that we might have seen before (such as Excel 2003 spreadsheets that cut off at 32k row).
- 2) **Ingest:** At this time the data is actually brought into our systems. Each provider is set up with a unique file geodatabase to store their information. Record counts of what was received are logged so that we can validate that we did not drop anything in processing.
- 3) **Data Processing:** In this step, the data goes through a number of ETL routines to convert the raw proprietary information into a format similar to the NTIA format. The exact routine utilized depends on how the data is received.
  - a. When a wireline provider submits a service boundary, we select all the blocks and roads inside that shape.
  - b. If a wireline provider submits a customer address list, the points are geocoded, and then the appropriate block or road segment is selected. For this submission, we added the 2012 TIGER street data for better geocoding and also created a better geocoding routine for addresses missing zip codes.
  - c. If a wireline provider submits block and road information using Census data, we make sure everything is formatted to the appropriate specifications.

- d. If the wireline provider submits any type of road or line data that does not directly correlate to the TIGER data set, we convert the lines to TIGER by selecting the road centroid and spatially selecting the closest segment in our data set. If the road is in a block less than 2 square miles, then the block is selected. Some manual cleanup is also applied to make sure we do not accidentally drop any road segments that should have been processed.
  - e. Wireless provider data is formatted to ensure that there are no overlapping polygons with the technology type and spectrum. In addition the data is cropped to the state boundary.
  - f. After each round of processing, we make sure that we only keep unique records. A unique record is defined as having a unique combination of FRN, Block/Road ID, and technology type. If there are multiple records with different speeds, but all else is equal, then we selected the maximum advertised speeds.
- 4) **QC Review:** All data are then sent to a different analyst to perform a thorough quality control review on the processed data set. Record counts are compared to what was submitted. The QC staff also makes sure the ETL scripts and routines populated all of the right fields.
  - 5) **QC Change Detection Review:** Data is then sent to another team for a second Quality Control Review. In this step the data is not only double checked against what was originally submitted, but it is also brought up inside standardized MXD templates that allow us to make sure our results make sense. This step involves comparing the new data set with prior submissions, developing change maps, and looking for any possible technology or speed anomalies. At this stage we also begin our validation process. This includes looking at the provider data in comparison to things such as speed test results, franchise boundaries, siting information, and feedback from the planning surveys.
  - 6) **Provider Review:** Processed data are posted to a customized web-mapping tool we refer to as the Provider Portal. All providers are notified once their data are available on the site, and given a specified period for review of the data and to respond. In this site, providers can log on and visually see their processed data in a map format. It also allows them to overlay their raw data to help them validate that we did indeed process things correctly. In this submission, we continued to use our enhancements to this tool providing the ability to highlight changes between submission 8 and submission 9. The provider portal also has a suite of markup tools that will allow the providers to edit their data, including adding or removing service areas, and making changes to the data attributes.
  - 7) **Comment Processing:** All comments and feedback received from the provider portal is then reviewed and applied to the processed data set. This updated data set goes back through our QA and QC processes, and

if time allows, back out to the Provider Portal, for the provider to review and sign off.

- 8) **Data Append:** After all of the individual data sets are processed and approved, we run an append process which merges all of the individual provider data sets into one geodatabase. This is also the point where our team will do any final transformations to get our working data model into the latest NTIA publishing format.
- 9) **Submission Comparison Check:** An application was written that compares this submission dataset to the previous submission. We review any variations and assure that the changes found can be documented as being requested by the provider.
- 10) **Final QA/QC:** A series of quality checks are run on the final appended data sets to ensure it is ready for submission to NTIA. We also run the latest version of the NTIA receipt tool at this time. If any issues are flagged as failing they are reviewed and corrected. All warnings are also reviewed and either corrected or documented in the attached document which explains that we have validated this data and it should be accepted.
- 11) **Deliver to NTIA and Publish to Web Applications:** A copy of the Append File Geodatabase is generated to be used in the provider portal web-based application. When verification feedback is received, the individual provider geodatabases are updated. After verification is complete, the Append process, including QA steps, is executed again and then submitted to NTIA.

## 2.3 DATA VALIDATION

Sanborn has continued to perform the same validation on the data as the previous eight submissions (details in previous reports and a summarized version provided below). Some minor updates to the validation process are discussed below.

- 1) QC of the data at various steps – this includes when data are received (triage), when it is processed through the various processing steps discussed above, etc.
- 2) Spatial checks against public and commercial datasets
  - a. For OK, we continued to use the following datasets for validation:
    - i. Exchange Boundaries: for DSL boundaries
    - ii. MediaPrints: for Cable and Fiber boundaries
    - iii. We reviewed the FCC Study area boundaries but were not confident about the completeness of that data and hence used our existing exchange boundaries. For the most part the two datasets aligned well.
- 3) Speedtest data and other data collection for verification
  - a. We continue to use speedtest data collected through our interactive map and community anchor data crowd-sourced for

- validation purposes. No FCC speed tests were available for this submission.
- b. We also incorporated any feedback we received through the interactive map – this included feedback such as incorrect speeds, incorrect boundaries, missing provider or areas of no service, etc.
- 4) Verification by providers – processed data are uploaded on our Provider Portal for providers to review both the outcome of data processing and any issues that we found in the third-party and crowd-sourced validation. Issues pertaining to a particular provider are highlighted and shown in the portal for those providers only. Issues that are global and cannot be assigned to a particular provider are shown to all providers (e.g. there are no providers in this area, or we tried to get service here and heard x from A provider, y from B provider, etc.). Previously, we were highlighting these issues through a letter but in this submission, we have integrated the feedback through the Provider Portal. We make additional calls to providers who have issues. We also look at any issues that the State has identified and brought to our attention.
  - 5) As with previous submissions, we did a significant amount of data validation at the statewide level and used change maps to see if there were any significant anomalies in the data.
  - 6) Planning workshops and local validation –
    - a. During this submission, local validation was undertaken by an independent group, the Center for Spatial Analysis at the University of Oklahoma (OU). OU provided outreach staff which worked with community leaders and participated in community-wide events or meetings in targeted rural areas to conduct interviews that resulted in gathering additional validation points. Face-to-face interviewing with business owners and employees of publicly accessible organizations was targeted to rural underserved or unserved areas with limited validation information available. From October through March, data points for validation were collected through traditional mail service, online, telephone and face-to-face survey methodologies. OU also encouraged individuals interviewed to refer others to take the online survey. For those individuals lacking internet access, they provided hard copy surveys with postage paid business reply envelopes.
    - b. Sanborn provides each submission's non-confidential data to the University of Oklahoma Center for Spatial Analysis for additional verification. Any conflicts noted in the data by OU based on outreach done by them are confirmed as valid by Sanborn and then given to the provider to validate/correct via Sanborn's provider portal.

## **2.4 SUBMISSION 9: NTIA DATA MODEL SCHEMA CHANGES**

The latest data model released was released in January 2014 and was very similar to the previous data model.

The primary changes that were made to the data model for this submission were:

- a. Technology type Code 60 (Satellite) increased in both Max Advertised Download Speed and Max Advertised Upload Speed
  - i. Max advertised download acceptable range is now Code 3 - Code 7
  - ii. Max advertise upload acceptable range is now Code 2 -Code 5
- b. Added ZZ as default value for road segments
- c. Removed codes 3 and 4 from End User Category in Address feature class.

## **2.5 UNIVERSE OF CONTACTED PROVIDERS/NON-PROVIDERS**

We have contacted a total of 217 providers in OK of which 12 providers were contacted for the first time.

We have identified 115 potential providers, of which 94 are participating in this map to date and 21 have refused to participate. In addition, 7 providers have not responded to our efforts to contact them and we are not sure whether any of these providers are actual providers or not. A list of the non-responders, resellers and non-providers is provided at the end of the document and all of these potential broadband providers were contacted. Even if some providers were identified as non-providers or resellers in previous submissions, we continue sending out data request letters to these providers in case their status has changed in any way.

### **2.5.1 Non-providers**

4D Networks Corp.  
ACRS 2000, Inc.  
Blossom Telephone Company, Inc.  
Cable West  
Charter Communications  
COMCAST CABLE COMMUNICATIONS, INC.  
Cyber Rover  
Fulltel  
INETmax  
IO-2 Services  
KoehlerPro Wireless  
LightEdge Solutions Inc.  
Magic Wireless Internet Service Providers LLC  
McLeodUSA Telecom Services Inc. / PaeTec Corp  
MEDIACOM LLC  
OKC Broadband (Ideal Advertising Inc.)  
OneLink Wireless  
OneNet  
Pavlov Media  
PCS Internet Services  
PRIDE Network, Inc.

Qwest Communications Company, LLC  
ruralOK  
Stouffer Communications / Granby Telephone  
Stratos Offshore Services Company  
Telovations, Inc.  
Texhoma Wireless  
The Internet Shop  
Tulsa MetroNet  
United Wireless Communications, Inc.  
UnplugUSA  
UTPhone Inc.  
VectorLink  
Verizon Business Global LLC dba Verizon Business  
Vidia Communications, Inc.  
Zayo Enterprise Networks, LLC

### **2.5.2 Resellers**

Broadview Networks Holding Inc.  
BullsEye Telecom, Inc.  
Earthlink  
Eventis Telecom Inc. / Hickory Tech Corp  
eVolve Business Solutions LLC/Cincinnati Bell Inc.  
Global Crossing Telecommunications Inc.  
Greenfly Networks, Inc.  
Inteltrace, Inc.  
LocalNet Corp  
Logix Communications, LP  
Metropolitan Telecommunications of Oklahoma, Inc.  
Network Innovations, Inc.  
New Edge Network, Inc.  
NewRoads Telecom  
Optimum  
Reallinx, Inc.  
Telefonica USA, Inc.  
TulsaConnect  
Westel, Inc.

### **2.5.3 Non-Responders/Difficulty Contacting**

eConnect  
HDR Internet Services/ OnALot.com  
KPowerNet, LLC/KAMO  
Lakeview Cable  
ms bit  
Onlineok.com  
Utopian Wireless Corporation

### **2.5.4 Not-Participating**

Atlas Telephone Company  
Buford Media Group, LLC

Coalgate Internet  
CSWEB.NET  
DataFlys  
EasyTEL Communications  
Flash-Link Internet Service  
horizon net  
LRC Group  
Meetpoint Networks  
Meriplex Communications, Ltd.  
Picks Communication  
PriceNET Wireless  
Reach Broadband  
RecTec  
Sooner Wireless  
Summit Digital, Inc.  
Tahlequah Cable/WEHCO Video, Inc.  
University Corporation for Advanced Internet  
upperspace.net  
WPS, Inc.